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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,319	12/04/2003	Peter J. Hopper	100-23800 (P05751)	4947

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EXAMINER

NHU, DAVID

ART UNIT PAPER NUMBER

2818

DATE MAILED: 07/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/728,319

Applicant(s)

HOPPER ET AL.

Examiner

David Nhu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTIONS

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Lu (6,479,341 B1).

**Regarding claim 1**, Lu, (see figures 1-6, col. 3, lines 25-67, col. 4, lines 1-67, col. 5, lines 1-54), teaches a method of processing a semiconductor material having a top surface and a bottom surface, the method comprising the steps of: forming a doped region 8 in the top surface of the semiconductor material; forming a hole 10, 11 in the semiconductor material 9 that extends through the semiconductor material, the hole having substantially anisotropic sidewalls/spacers 7 (see figure 1); and forming a metallic plug 10, 11 in the hole (see figure 2). Regarding claims 2, 3, 4, Lu, (see figure 1), also teaches forming a hole includes: forming a layer of masking material 9 to expose a region of the top surface of the semiconductor material; patterning the layer of masking material to expose a region of the top surface of the semiconductor material; wet etching the region of the semiconductor material with an etchant to form the hole.

Regarding claim 5, Lu, (see figures 3-6), teaches forming a first layer of material 16 on the semiconductor material 9 to line the hole ; forming a second layer of material 40 on the first layer, the second layer being different from the first layer.

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Regarding claims 6, 7, 8, Lu, (see figures 1-6), teaches the first layer of material is a barrier layer 19; forming a metallic material 20 on the second layer of material to fill up the hole 18b; removing the first layer of material from the top and the bottom surfaces of the semiconductor material to form a conductive plug W (see figure 5).

Regarding claim 9, Lu, (see figures 2-3), teaches forming a layer of insulating/dielectric material 9 on the top surface of the semiconductor material 1, the insulating material having a top surface; forming a first opening 10, 11 a and second opening 13 in the layer of insulating material, the first opening exposing the doped region 8, the second opening exposing the conductive plug 14.

Regarding claim 10, Lu (see figures 4-6), teaches forming a first contact structure 16 in the first opening to make an electrical connection with the doped region 8; forming a second contact structure 40 with the conductive plug 20.

Regarding claim 11, Lu (see figure 6), teaches forming a layer of (metal-1) 16 on the layer of insulating material 9, 12, the first contact 13a, and the second contact 13b.

### **Conclusion**

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Dark'797, Dark'189, Smith'053, Zhao'787 are cited as of interest.
4. A shortened statutory period for response to this action is set to expired 3 (three) months and 0 (zero) day from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned (see 710.02 (b)).
5. Any inquiry concerning this communication on earlier communications from the examiner should be directed to David Nhu, (571)272-1792. The examiner can normally be reached on

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Monday-Friday from 7:30 AM to 5:00 PM. The examiner's supervisor, David Nelms can be reached on (571)272-1787.

*The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.*

*Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.*

*Information regarding the status of an application may be obtained from the patent application information retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).*

David Nhu



June 29, 2005

